This Response To Office Action is in response to the Office Action mailed November 10, 2003.

In the Claims

1 (currently amended). An arrangement for generating a representation of a feature in a surface defined by a mesh representation, the mesh comprising at a selected level a plurality of points including at least one point, referred to as a vertex, connected to a plurality of neighboring points by respective edges, the feature being defined in connection with the vertex and at least one of the neighboring points and the edge interconnecting the vertex and the at least one of the neighboring points in the mesh representation, the feature generating arrangement comprising:

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A. a weight vector generator module configured to generate at least one weight vector based on a parameterized subdivision rule defined at a plurality of levels, for which a value of at least one parameter differs at at least two levels in the mesh; and

B. a feature representation generator module configured to use the at least one weight vector and positions of the vertex and the neighboring points to generate the representation of the feature.

2 (currently amended). An arrangement as defined in claim 1 in which the weight vector generator module is configured to make use of values of the at least one parameter that differ at at least two levels are related by a selected mathematical function.

3 (original). An arrangement as defined in claim 1 in which the feature is a smooth feature line.

4 (currently amended). An arrangement as defined in claim 3 in which the smooth feature line is defined in connection with the vertex and two neighboring points and edges interconnecting the vertex and the respective neighboring points, the weight vector generator module being configured to make use of the parameterized subdivision rule having a parameter value associated with each of the edges along which the smooth feature line is defined.

5 (original). An arrangement as defined in claim 4 in which the weight vector generator module is configured to make use of parameters associated with the edges along which the smooth feature line is defined whose values are the same.

6 (original). An arrangement as defined in claim 5 in which the weight vector generator module is configured to make use of the parameters that are in relation to a subdivision rule that, in turn, reflects a sharp crease along the edges along which the smooth feature line is defined, the values of the parameters being defined in the interval [0,1], where higher values define a sharper crease, the values of the parameters at a lower level being related to the values of the parameters at a higher level being related by

$$s(j+1) = (s(j))^2 ,$$

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where s(j) represents the values of the parameters at level "j" and s(j+1) represents the values of the parameters at the higher level "j+1."

7 (original). An arrangement as defined in claim 4 in which the weight vector generator module is configured to make use of parameters associated with the edges along which the smooth feature line is defined whose values differ.

8 (original). An arrangement as defined in claim 7 in which the weight vector generator module is configured to make use of the parameters that are in relation to a subdivision rule that, in turn, reflects a sharp crease along the edges along which the smooth feature line is defined, the values of the parameters being defined in the interval [0,1], where higher values define a sharper crease, the values of the parameters at a lower level being related to the values of the parameters at a higher level being related by

$$s_1(j+1) = \left(\frac{3}{4}s_1(j) + \frac{1}{4}s_2(j)\right)^2 ,$$

and

$$s_2(j+1) \;=\; \left(\frac{1}{4}s_1(j)+\frac{3}{4}s_2(j)\right)^2 \qquad ,$$

where $s_1(j)$ and $s_2(j)$ represent the values of the parameters associated with the respective edges at level "j," and $s_1(j+1)$ and $s_2(j+1)$ represent the values of the parameters associated with the respective edges at the higher level "j+1."

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9 (original). An arrangement as defined in claim 4 in which the mesh comprises a triangular mesh in which, at a selected level "j," vertex $v_q(0)$ is at position $c^j(0)$ and neighboring points $v_q(k)$, $k=1,\ldots,K$ are at respective positions $c^j(k)$, and in which the weight vector generator module is configured to make use of a parameterized subdivision rule $S_{sc,T,K,L}$ that relates the position $c^{j+1}(0)$ of the vertex $v_q(0)$ and positions $c^{j+1}(k)$ of neighboring points $v_q(k)$ at the next higher level "j+1" as follows

$$c^{j+1} \;=\; S_{sc,T,K,L}\, c^j \qquad ,$$

where subdivision rule $S_{sc,T,K,L}$ is given by

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$$
\left(S_{sc,T,K,L}(s_1,s_2)\right)_{l,m} = \begin{cases}
(1-s_3)(1-a(K))+\frac{3}{4}s_3 & \text{if } l=0, m=0 \\
(1-s_3)\frac{a(K)}{K}+\frac{1}{8}s_3 & \text{if } l=0, m=1 \text{ or } L+1 \\
(1-s_3)\frac{a(K)}{K} & \text{if } l=0, m=2,\dots,L \\
 & \text{or } l=0, m=L+2,\dots,K \\
\frac{3}{8}+\frac{1}{8}s_2 & \text{if } l=1, m=0 \text{ or } 1 \\
\frac{3}{8}+\frac{1}{8}s_1 & \text{if } l=L+1, m=0 \text{ or } L+1 \\
\frac{1}{8}(1-s_2) & \text{if } l=1, m=2 \text{ or } K \\
\frac{1}{8}(1-s_1) & \text{if } l=L+1, m=L \text{ or } L+2 \\
\frac{3}{8} & \text{if } l=2,\dots,L, m=0 \\
 & \text{or } l=L+2,\dots,K, m=0 \\
 & \text{or } l=m=2,\dots,L \\
 & \text{or } l=m=L+2,\dots,K \\
\frac{1}{8} & \text{if } l=2,\dots,L, m=l-1 \\
 & \text{or } l=L+2,\dots,K, m=l-1 \\
 & \text{or } l=2,\dots,L, m=l+1 \\
 & \text{or } l=L+2,\dots,K, m=l+1 \\
 & \text{or } l=K, m=1 \\
0 & \text{otherwise}
\end{cases},
$$

where the smooth feature line is defined in connection with the edges between respective points $v_q(1)$ and $v_q(L+1)$ $(L+1 \leq K)$ and vertex $v_q(0)$, $s_1$ is the parameter associated with the edge between point

$v_q(1)$ and vertex $v_q(0)$, $s_2$ is the parameter associated with the edge between point $v_q(L+1)$ and vertex $v_q(0)$, $s_3 = \frac{1}{2}\left(s_1 + s_2\right)$, and

$$\alpha(K) = \frac{5}{8} - \left(\frac{3 + 2\cos\left(\frac{2\pi}{K}\right)}{8}\right)^2$$

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10 (original). An arrangement as defined in claim 9 in which the representation of the feature is defined by at least one limit point associated with the vertex, the feature representation generator module being configured to determine a position σ(q) of the limit point in accordance with

$$\sigma(q) = \sum_{i=0}^{K} \left(l_{LP}\left(s_1, s_2\right)\right)_i c^j(i) ,$$

where $l_{LP}(s_1,s_2)$ is a vector of limit point weight values defined by

$$l_{LP}\left(s_1, s_2\right) = v_{LP} \cdot S_{sc,T,K,L,LP}\left(s_1, s_2\right) ,$$

where

$$S_{sc,T,K,L,LP}\left(s_1, s_2\right) = \prod_{j=\infty}^{j_D} S_{sc,T,K,L}\left(s_1(j), s_2(j)\right) ,$$

where $S_{sc,T,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,T,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product, where $S_{sc,T,K,L,LP}(s_1,s_2)$ arguments $s_1$ and $s_2$ on the left-hand side refer to the sharpness parameters a definition level of the smooth feature line and the subscript "LP" refers to "Limit Point," and

$$v_{LP} = \left( \frac{\omega(K)}{\varpi(K)+K}, \frac{1}{\varpi(K)+K}, \frac{1}{\varpi(K)+K}, \ldots, \frac{1}{\varpi(K)+K} \right),$$

where

$$\varpi(K) = \frac{3K}{8\,a(K)}.$$

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11 (original). An arrangement as defined in claim 10 in which the weight vector generator module is configured to generate an approximation for the limit point weight vector $l_{LP}$ using a polynomial approximation methodology.

12 (original). An arrangement as defined in claim 11 in which the weight vector generator module is configured to generate the approximation for the limit point weight vector $l_{LP}$ in accordance with the polynomial

$$\left(l_{LP}\right)_i \approx b_{i0} + b_{i1}\left(s_1 + s_2\right) + b_{i2}\left(s_1^2 + s_2^2\right) + b_{i3}s_1s_2,$$

in a symmetric case, or the polynomial

$$\left(l_{LP}\right)_i \approx b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_2^2 + b_{i5}s_1s_2,$$

in an asymmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

13 (original). An arrangement as defined in claim 12 in which weight vector generator module is configured to select values of $s_1$ and $s_2$ in accordance with

$$\left(s_1, s_2\right) = \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right),$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

14 (original). An arrangement as defined in claim 10 in which the weight vector generator module is configured to generate an approximation for the limit point weight vector $l_{LP}$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

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15 (original). An arrangement as defined in claim 14 in which the weight vector generator module is configured to perform the extrapolation approximation methodology such that M=3.

16 (original). An arrangement as defined in claim 15 in which the weight vector generator module is configured to generate the approximation for the limit point weight vector weight vector in accordance with

$$l_{LP} \approx \sum_{J=0}^{3} b_J l_{LP}(J),$$

where "J" is a predetermined integer and where

$$\left(l_{LP}(J)\left(s_1, s_2\right)\right)_m = \left(S_{sc,T,K.L,LP}(J)\left(s_1, s_2\right)\right)_{1,m},$$

where

$$S_{sc,T,K,L,LP}(J)(s_1,s_2) \quad := \quad \prod_{j=J}^{0} S_{sc,T,K,L}(s_1(j),s_2(j)) \quad ,$$

with

$$S_{sc,T,K,L,LP}(0)(s_1,s_2) \quad := \quad I_{K+1} \quad ,$$

where $I_{K+1}$ is the "K+1" by "K+1" identity matrix, and

where

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$$b_0 \quad = \quad \frac{-135}{120015}$$

$$b_1 \quad = \quad \frac{1270}{120015}$$

$$b_2 \quad = \quad \frac{-12192}{120015}$$

$$b_3 \quad = \quad \frac{131072}{120015}$$

17 (original). An arrangement as defined in claim 9 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being along the smooth feature line, the feature representation generator module being configured to determine the tangent vector $e_C(q)$ in accordance with

$$e_C(q) = \sum_{i=0}^{K} \left(l_C(s_1, s_2)\right)_i c^j(i) ,$$

where $l_C(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_C = \lim_{J\to\infty} \frac{l_C(J)}{\left\|l_C(J)\right\|} ,$$

where $\|v\| = \sqrt{\sum_i v_i^2}$ , that is, the Euclidean norm, and where

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$$l_C(J) = (0,1,0,\ldots,-1,0,\ldots)\cdot \prod_{j=J}^{j_D} S_{sc,T,K,L}\left(s_1(j), s_2(j)\right) ,$$

where two non-zero components of the row vector on the right hand side are a "one" at position "one" in the row vector, and a "negative one" at position $\frac{K}{2}+1$, and where $S_{sc,T,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,T,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product.

18 (original). An arrangement as defined in claim 17 in which the weight vector generator module is configured to generate the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

19 (original). An arrangement as defined in claim 18 in which the weight vector generator module is configured to generate the approximation for the tangent vector weight vector $l_C$ in accordance with the polynomial

$$\left(l_C\right)_i = b_{i0}\left(s_1 - s_2\right) + b_{i1}\left(s_1^2 - s_2^2\right) + b_{i2}\left(s_1^3 - s_2^3\right) + b_{i3}\left(s_1^2 s_2 - s_1 s_2^2\right),$$

in the anti-symmetric case, or the polynomial

$$\begin{aligned}\left(l_C\right)_i = {} & b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1 s_2 + \\ & b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2 s_2 + b_{i8}s_1 s_2^2 + b_{i9}s_2^3\end{aligned},$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

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20 (original). An arrangement as defined in claim 19 in which weight vector generator module is configured to select values of $s_1$ and $s_2$ in accordance with

$$\left(s_1, s_2\right) = \left(\cos\left(\frac{\left(i + \frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j + \frac{1}{2}\right)\pi}{N}\right)\right),$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

21 (original). An arrangement as defined in claim 17 in which the weight vector generator module is configured to generate an approximation for the tangent vector weight vector $l_C$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

22 (original). An arrangement as defined in claim 21 in which the weight vector generator module is configured to perform the extrapolation approximation methodology such that M=3.

23 (original). An arrangement as defined in claim 22 in which the weight vector generator module is configured to generate the approximation for the tangent vector weight vector $l_C$ in accordance with

$$l_C \approx \sum_{J=0}^{3} b_J l_C(J) ,$$

where "J" is a predetermined integer and where

$$l_C(J)(s_1, s_2) = d(K)^J v_C \cdot S_{sc,T,K,L,LP}(J)(s_1, s_2) ,$$

where vector $v_C$ is given by

$$v_C = \left(0, \cos\frac{2\pi(0)}{K}, \cos\frac{2\pi(1)}{K}, \ldots, \cos\frac{2\pi(K-1)}{K}\right) ,$$

dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} ,$$

and

$$S_{sc,T,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,T,K,L}\left(s_1(j), s_2(j)\right) ,$$

with

$$S_{sc,T,K,L,LP}(0)(s_1, s_2) := I_{K+1} ,$$

where $I_{K+1}$ is the "K+1" by "K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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24 (original). An arrangement as defined in claim 9 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being across the smooth feature line, the feature representation generator module being configured to determine the tangent vector $e_C(q)$ in accordance with

$$e_S(q) = \sum_{i=0}^{K} \left(l_S(s_1, s_2)\right)_i c^j(i) ,$$

where $l_S(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_S = \lim_{j \to \infty} \frac{l_S(J)}{\|l_S(J)\|} ,$$

where $\|v\| = \sqrt{\sum_i v_i^2}$ , that is, the Euclidean norm, where

$$l_S(J)=\left(0, \sin\frac{2\pi(0)}{K}, \sin\frac{2\pi(1)}{K}, \ldots, \sin\frac{2\pi(K-1)}{K}\right)\cdot\prod_{j=J}^{j_D} S_{sc,T,K,L}\big(s_1(j),s_2(j)\big) \quad ,$$

where $S_{sc,T,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,T,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product.

25 (original). An arrangement as defined in claim 24 in which the weight vector generator module is configured to generate the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

26 (original). An arrangement as defined in claim 25 in which the weight vector generator module is configured to generate the approximation for the tangent vector weight vector $l_S$ in accordance with the polynomial

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$$\left(l_S\right)_i \quad = \quad b_{i0}\left(s_1-s_2\right)+b_{i1}\left(s_1^2-s_2^2\right)+b_{i2}\left(s_1^3-s_2^3\right)+b_{i3}\left(s_1^2 s_2-s_1 s_2^2\right) \quad ,$$

in the anti-symmetric case, or the polynomial

$$\begin{aligned}\left(l_S\right)_i \quad = \quad & b_{i0}+b_{i1}s_1+b_{i2}s_2+b_{i3}s_1^2+b_{i4}s_1 s_2+ \\ & b_{i5}s_2^2+b_{i6}s_1^3+b_{i7}s_1^2 s_2+b_{i8}s_1 s_2^2+b_{i9}s_2^3\end{aligned} \quad ,$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

27 (original). An arrangement as defined in claim 26 in which weight vector generator module is configured to select values of $s_1$ and $s_2$ in accordance with

$$(s_1, s_2) = \left( \cos\left( \frac{\left(i + \frac{1}{2}\right)\pi}{N} \right), \cos\left( \frac{\left(j + \frac{1}{2}\right)\pi}{N} \right) \right),$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

28 (original). An arrangement as defined in claim 23 in which the weight vector generator module is configured to generate an approximation for the tangent vector weight vector $l_S$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

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29 (original). An arrangement as defined in claim 28 in which the weight vector generator module is configured to perform the extrapolation approximation methodology such that M=3.

30 (original). An arrangement as defined in claim 29 in which the weight vector generator module is configured to generate the approximation for the limit point weight vector weight vector in accordance with

$$l_S \approx \sum_{J=0}^{3} b_J l_S(J),$$

where "J" is a predetermined integer and where

$$l_S(J)(s_1, s_2) = d(K)^J v_S \cdot S_{sc,T,K,L,LP}(J)(s_1, s_2),$$

where vector $v_S$ is given by

$$v_S = \left(0, \sin\frac{2\pi(0)}{K}, \sin\frac{2\pi(1)}{K}, \ldots, \sin\frac{2\pi(K-1)}{K}\right),$$

dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}},$$

and

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$$S_{sc,T,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,T,K,L}(s_1(j), s_2(j)),$$

with

$$S_{sc,T,K,L,LP}(0)(s_1, s_2) := I_{K+1},$$

where $I_{K+1}$ is the "K+1" by "K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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31 (original). An arrangement as defined in claim 4 in which the mesh comprises a quadrilateral mesh in which, at a selected level "j," vertex $v_q(0)$ is at position $c^j(0)$ and neighboring points $v_q(k)$, k=1,...,2K are at respective positions $c^j(k)$, and in which the weight vector generator module is configured to make use of a parameterized subdivision rule $S_{sc,Q,K,L}$ that relates the position $c^{j+1}(0)$ of the vertex $v_q(0)$ and positions $c^{j+1}(k)$ of neighboring points $v_q(k)$ at the next higher level "j+1" as follows

$$c^{j+1} = S_{sc,T,K,L}\, c^j \quad ,$$

where subdivision rule $S_{sc,Q,K,L}$ is given by

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$$\left(S_{sc,Q,K,L}(s_1,s_2)\right)_{l,m} = \begin{cases} (1-s_3)\left(1-\frac{7}{4K}\right)+\frac{3}{4}s_3 & \text{if } l=0, m=0 \\ (1-s_3)\left(\frac{3}{2K^2}\right)+\frac{1}{8}s_3 & \text{if } l=0, m=1 \text{ or } L+1 \\ (1-s_3)\left(\frac{3}{2K^2}\right) & \text{if } l=0, m=2,\ldots,L \\ & \text{or } l=0, m=L+2,\ldots,K \\ (1-s_3)\left(\frac{1}{4K^2}\right) & \text{if } l=0, m=K+1,\ldots,2K \\ \frac{3}{8}(1-s_2)+\frac{1}{2}s_2 & \text{if } l=1, m=0 \text{ or } 1 \\ \frac{1}{16}(1-s_2) & \text{if } l=L+1, m=2, K, \\ & \quad K+1 \text{ or } 2K \\ \frac{3}{8}(1-s_1)+\frac{1}{2}s_1 & \text{if } l=L+1, m=0 \text{ or } L+1 \\ \frac{1}{16}(1-s_1) & \text{if } l=L+1, m=L, L+2, \\ & \quad K+1 \text{ or } K+L+1 \\ \frac{3}{8} & \text{if } l=2,\ldots,L, m=0 \\ & \text{or } l=L+2,\ldots,K, m=0 \\ & \text{or } l=m=2,\ldots,L \\ & \text{or } l=m=L+2,\ldots K \\ \frac{1}{16} & \text{if } l=2,\ldots,L, m=l-1 \\ & \text{or } l=2,\ldots,L, m=l+1 \\ & \text{or } l=2,\ldots,L, m=K+l-1 \\ & \text{or } l=2,\ldots,L, m=K+l \\ & \text{or } l=L+2,\ldots,K, m=l-1 \\ & \text{or } l=L+2,\ldots,K-1, m=l+1 \\ & \text{or } l=K, m=1 \\ & \text{or } l=L+2,\ldots,K, m=K+l-1 \\ & \text{or } l=L+2,\ldots,K, m=K+l \\ \frac{1}{4} & \text{if } l=K+1,\ldots,2K-1, m=0, \\ & \quad l-K, l-K+1 \text{ or } l \\ & \text{or } l=2K, m=0, K, 1 \text{ or } 2K \\ 0 & \text{otherwise} \end{cases},$$

where the smooth feature line is defined in connection with the edges between respective points $v_q(1)$ and $v_q(L+1)$ $(L+1 \leq 2K)$ and vertex $v_q(0)$, $s_1$ is the parameter associated with the edge between point $v_q(1)$ and vertex $v_q(0)$, $s_2$ is the parameter associated with the edge between point $v_q(L+1)$ and vertex $v_q(0)$, and $s_3 = \frac{1}{2}(s_1 + s_2)$.

32 (original). An arrangement as defined in claim 31 in which the representation of the feature is defined by at least one limit point associated with the vertex, the feature representation generator module being configured to determine a position $\sigma(q)$ of the limit point in accordance with

$$\sigma(q) = \sum_{i=0}^{2K} \left(l_{LP}(s_1, s_2)\right)_i c^j(i) ,$$

where $l_{LP}(s_1,s_2)$ is a vector of limit point weight values defined by

$$l_{LP}(s_1, s_2) = v_{LP} \cdot S_{sc,Q,K,L,LP}(s_1, s_2) ,$$

where

$$S_{sc,Q,K,L,LP}(s_1, s_2) = \prod_{j=\infty}^{j_D} S_{sc,Q,K,L}(s_1(j), s_2(j)) ,$$

where $S_{sc,Q,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,Q,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product, where $S_{sc,Q,K,L,LP}(s_1,s_2)$ arguments $s_1$ and $s_2$ on the left-hand side refer to the sharpness parameters a definition level of the smooth feature line and the subscript "LP" refers to "Limit Point," and

$$v_{LP} = \frac{1}{K(K+5)}(K^2, 4, \ldots, 4, 1, \ldots, 1) .$$

33 (original). An arrangement as defined in claim 32 in which the weight vector generator module is configured to generate an approximation for the limit point weight vector $l_{LP}$ using a polynomial approximation methodology.

34 (original). An arrangement as defined in claim 33 in which the weight vector generator module is configured to generate the approximation for the limit point weight vector $l_{LP}$ in accordance with the polynomial

$$(l_{LP})_i \approx b_{i0} + b_{i1}(s_1 + s_2) + b_{i2}(s_1^2 + s_2^2) + b_{i3}s_1s_2 ,$$

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in a symmetric case, or the polynomial

$$(l_{LP})_i \approx b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + b_{i5}s_2^2 ,$$

in an asymmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

35 (original). An arrangement as defined in claim 34 in which weight vector generator module is configured to select values of $s_1$ and $s_2$ in accordance with

$$(s_1, s_2) = \left( \cos\left( \frac{\left(i + \frac{1}{2}\right)\pi}{N} \right), \cos\left( \frac{\left(j + \frac{1}{2}\right)\pi}{N} \right) \right) ,$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

36 (original). An arrangement as defined in claim 32 in which the weight vector generator module is configured to generate an approximation for the limit point weight vector $l_{LP}$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points

$\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

37 (original). An arrangement as defined in claim 36 in which the weight vector generator module is configured to perform the extrapolation approximation methodology such that M=3.

38 (original). An arrangement as defined in claim 37 in which the weight vector generator module is configured to generate the approxiation for the limit point weight vector weight vector in accordance with

$$l_{LP} \approx \sum_{J=0}^{3} b_J l_{LP}(J) ,$$

where "J" is a predetermined integer and where

$$\left(l_{LP}(J)(s_1, s_2)\right)_m = \left(S_{sc,Q,K.L,LP}(J)(s_1, s_2)\right)_{1,m} ,$$

where

$$S_{sc,Q,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

with

$$S_{sc,Q,K,L,LP}(0)(s_1, s_2) := I_{2K+1} ,$$

where $I_{2K+1}$ is the "2K+1" by "2K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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39 (original). An arrangement as defined in claim 31 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being along the smooth feature line, the feature representation generator module being configured to determine the tangent vector $e_C(q)$ in accordance with

$$e_C(q) = \sum_{i=0}^{2K} \left(l_C(s_1, s_2)\right)_i c^j(i) \qquad ,$$

where $l_C(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_C(s_1, s_2) = d(K)^K v_c \cdot S_{sc,Q,K,L,LP}\left(s_1(j), s_2(j)\right) \qquad ,$$

where

$$S_{sc,Q,K,L,LP}(s_1, s_2) = \prod_{j=\infty}^{j_D} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) \qquad ,$$

and vector $v_C$ is defined as

$$(v_c)_i = \begin{cases} 0 & if\ i = 0 \\ A_k \cos\dfrac{2\pi(i-1)}{K} & if\ i = 1,\ldots,K \\ \cos\dfrac{2\pi(i-K-1)}{K} + \cos\dfrac{2\pi(i-K)}{K} & if\ i = K+1,\ldots,2K \end{cases} ,$$

where

$$A_K = 1+\cos\left(\frac{2\pi}{K}\right)+\cos\left(\frac{\pi}{K}\right)\sqrt{2\left(9+\cos\frac{2\pi}{K}\right)} ,$$

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and where dilation factor d(K) is given by

$$d(K) = \frac{1}{\dfrac{A_K}{16}+\dfrac{1}{4}} .$$

40 (original). An arrangement as defined in claim 39 in which the weight vector generator module is configured to generate the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

41 (original). An arrangement as defined in claim 40 in which the weight vector generator module is configured to generate the approximation for the tangent vector weight vector $l_C$ in accordance with the polynomial

$$(l_C)_i \approx b_{i0}(s_1 - s_2) + b_{i1}(s_1^2 - s_2^2) + b_{i2}(s_1^3 - s_2^3) + b_{i3}(s_1^2 s_2 - s_1 s_2^2) ,$$

in the anti-symmetric case, or the polynomial

$$\left(l_C\right)_i \approx b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2s_2 + b_{i8}s_1s_2^2 + b_{i9}s_2^3 \quad ,$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

42 (original). An arrangement as defined in claim 41 in which weight vector generator module is configured to select values of $s_1$ and $s_2$ in accordance with

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$$\left(s_1, s_2\right) = \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right) \quad ,$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

43 (original). An arrangement as defined in claim 39 in which the weight vector generator module is configured to generate an approximation for the tangent vector weight vector $l_C$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

44 (original). An arrangement as defined in claim 43 in which the weight vector generator module is configured to perform the extrapolation approximation methodology such that M=3.

45 (original). An arrangement as defined in claim 44 in which the weight vector generator module is configured to generate the approximation for the tangent vector weight vector $l_C$ in accordance with

$$l_C \approx \sum_{J=0}^{3} b_J l_C(J) ,$$

where "J" is a predetermined integer and where

$$l_C(J)(s_1, s_2) = d(K)^J v_C \cdot S_{sc,Q,K,L,LP}(J)(s_1, s_2) ,$$

where vector $v_C$ is given by

$$v_C = \left(0, \cos\frac{2\pi(0)}{K}, \cos\frac{2\pi(1)}{K}, \ldots, \cos\frac{2\pi(K-1)}{K}\right) ,$$

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dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} ,$$

and

$$S_{sc,Q,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

with

$$S_{sc,Q,K,L,LP}(0)(s_1, s_2) := I_{2K+1} ,$$

where $I_{K+1}$ is the "2K+1" by "2K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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46 (original). An arrangement as defined in claim 31 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being across the smooth feature line, the feature representation generator module being configured to determine the tangent vector $e_C(q)$ in accordance with

$$e_S(q) = \sum_{i=0}^{2K} \left(l_S(s_1, s_2)\right)_i c^j(i) ,$$

where $l_C(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_S(s_1, s_2) = d(K)^K v_S \cdot S_{sc,Q,K,L,LP}\left(s_1(j), s_2(j)\right) ,$$

where

$$S_{sc,Q,K,L,LP}(s_1, s_2) = \prod_{j=\infty}^{j_D} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

and vector $v_C$ is defined as

$$(v_S)_i = \begin{cases} 0 & if\ i = 0 \\ A_k \sin\dfrac{2\pi(i-1)}{K} & if\ i = 1,\ldots,K \\ \sin\dfrac{2\pi(i-K-1)}{K} + \sin\dfrac{2\pi(i-K)}{K} & if\ i = K+1,\ldots,2K \end{cases},$$

where

$$A_K = 1 + \cos\left(\frac{2\pi}{K}\right) + \cos\left(\frac{\pi}{K}\right)\sqrt{2\left(9 + \cos\frac{2\pi}{K}\right)},$$

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and where dilation factor d(K) is given by

$$d(K) = \frac{1}{\dfrac{A_K}{16} + \dfrac{1}{4}}.$$

47 (original). An arrangement as defined in claim 46 in which the weight vector generator module is configured to generate the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

48 (original). An arrangement as defined in claim 47 in which the weight vector generator module is configured to generate the approximation for the tangent vector weight vector $l_S$ in accordance with the polynomial

$$(l_S)_i = b_{i0}(s_1 - s_2) + b_{i1}(s_1^2 - s_2^2) + b_{i2}(s_1^3 - s_2^3) + b_{i3}(s_1^2 s_2 - s_1 s_2^2),$$

in the anti-symmetric case, or the polynomial

$$\begin{aligned}(l_S)_i \quad = \quad & b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + \\ & b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2s_2 + b_{i8}s_1s_2^2 + b_{i9}s_2^3\end{aligned},$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

49 (original). An arrangement as defined in claim 48 in which weight vector generator module is configured to select values of $s_1$ and $s_2$ in accordance with

$$(s_1, s_2) \quad = \quad \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right),$$

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where "N" is a selected integer, and indices i,j=0,...,N-1.

50 (original). An arrangement as defined in claim 46 in which the weight vector generator module is configured to generate an approximation for the tangent vector weight vector $l_S$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

51 (original). An arrangement as defined in claim 50 in which the weight vector generator module is configured to perform the extrapolation approximation methodology such that M=3.

52 (original). An arrangement as defined in claim 51 in which the weight vector generator module is configured to generate the approximation for the limit point weight vector weight vector in accordance with

$$l_S \approx \sum_{J=0}^{3} b_J l_S(J) ,$$

where "J" is a predetermined integer and where

$$l_S(J)(s_1, s_2) = d(K)^J v_S \cdot S_{sc,Q,K,L,LP}(J)(s_1, s_2) ,$$

where vector $v_S$ is given by

$$v_S = \left(0, \sin\frac{2\pi(0)}{K}, \sin\frac{2\pi(1)}{K}, \ldots, \sin\frac{2\pi(K-1)}{K}\right) ,$$

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dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} ,$$

and

$$S_{sc,Q,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

with

$$S_{sc,Q,K,L,LP}(0)(s_1, s_2) := I_{2K+1} ,$$

where $I_{2K+1}$ is the "2K+1" by "2K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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53 (currently amended). A computer program product for use in connection with a computer to provide an arrangement for generating a representation of a feature in a surface defined by a mesh representation, the mesh comprising at a selected level a plurality of points including at least one point, referred to as a vertex, connected to a plurality of neighboring points by respective edges, the feature being defined in connection with the vertex and at least one of the neighboring points and the edge interconnecting the vertex and the at least one of the neighboring points in the mesh representation, the computer program product comprising:

A. a weight vector generator module configured to enable the computer to generate at least one weight vector based on a parameterized subdivision rule defined at a plurality of levels, for which a value of at least one parameter differs at at least two levels in the mesh; and

B. a feature representation generator module configured to enable the computer to use the at least one weight vector and positions of the vertex and the neighboring points to generate the representation of the feature.

54 (currently amended). A computer program product as defined in claim 53 in which the weight vector generator module is configured to enable the computer to make use of values of the at least one parameter that differ at at least two levels are related by a selected mathematical function.

55 (original). A computer program product as defined in claim 53 in which the feature is a smooth feature line.

56 (currently amended). A computer program product as defined in claim 55 in which the smooth feature line is defined in connection with the vertex and two neighboring points and edges interconnecting the vertex and the respective neighboring points, the weight vector generator module being configured to enable the computer to make use of <u>the</u> parameterized subdivision rule having a parameter value associated with each of the edges along which the smooth feature line is defined.

57 (original). A computer program product as defined in claim 56 in which the weight vector generator module is configured to enable the computer to make use of parameters associated with the edges along which the smooth feature line is defined whose values are the same.

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58 (original). A computer program product as defined in claim 57 in which the weight vector generator module is configured to enable the computer to make use of the parameters that are in relation to a subdivision rule that, in turn, reflects a sharp crease along the edges along which the smooth feature line is defined, the values of the parameters being defined in the interval [0,1], where higher values define a sharper crease, the values of the parameters at a lower level being related to the values of the parameters at a higher level being related by

$$s(j+1) = (s(j))^2 ,$$

where s(j) represents the values of the parameters at level "j" and s(j+1) represents the values of the parameters at the higher level "j+1."

59 (original). A computer program product as defined in claim 56 in which the weight vector generator module is configured to enable the computer to make use of parameters associated with the edges along which the smooth feature line is defined whose values differ.

60 (original). A computer program product as defined in claim 59 in which the weight vector generator module is configured to enable the computer to make use of the parameters that are in relation to a subdivision rule that, in turn, reflects a sharp crease along the edges along which the smooth feature line is defined, the values of the parameters being defined in the interval [0,1], where higher values define a sharper crease, the values of the parameters at a lower level being related to the values of the parameters at a higher level being related by

$$s_1(j+1) = \left(\frac{3}{4}s_1(j)+\frac{1}{4}s_2(j)\right)^2 ,$$

and

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$$s_2(j+1) = \left(\frac{1}{4}s_1(j)+\frac{3}{4}s_2(j)\right)^2 ,$$

where $s_1(j)$ and $s_2(j)$ represent the values of the parameters associated with the respective edges at level "j," and $s_1(j+1)$ and $s_2(j+1)$ represent the values of the parameters associated with the respective edges at the higher level "j+1."

61 (original). A computer program product as defined in claim 56 in which the mesh comprises a triangular mesh in which, at a selected level "j," vertex $v_q(0)$ is at position $c^j(0)$ and neighboring points $v_q(k)$, k=1,...,K are at respective positions $c^j(k)$, and in which the weight vector generator module is configured to enable the computer to make use of a parameterized subdivision rule $S_{sc,T,K,L}$ that relates the position $c^{j+1}(0)$ of the vertex $v_q(0)$ and positions $c^{j+1}(k)$ of neighboring points $v_q(k)$ at the next higher level "j+1" as follows

$$c^{j+1} = S_{sc,T,K,L}\, c^j ,$$

where subdivision rule $S_{sc,T,K,L}$ is given by

M Cont

$$\left(S_{sc,T,K,L}(s_1,s_2)\right)_{l,m} = \begin{cases} (1-s_3)(1-a(K))+\frac{3}{4}s_3 & \text{if } l=0, m=0 \\ (1-s_3)\frac{a(K)}{K}+\frac{1}{8}s_3 & \text{if } l=0, m=1 \text{ or } L+1 \\ (1-s_3)\frac{a(K)}{K} & \text{if } l=0, m=2,\ldots,L \\ & \text{or } l=0, m=L+2,\ldots,K \\ \frac{3}{8}+\frac{1}{8}s_2 & \text{if } l=1, m=0 \text{ or } 1 \\ \frac{3}{8}+\frac{1}{8}s_1 & \text{if } l=L+1, m=0 \text{ or } L+1 \\ \frac{1}{8}(1-s_2) & \text{if } l=1, m=2 \text{ or } K \\ \frac{1}{8}(1-s_1) & \text{if } l=L+1, m=L \text{ or } L+2 \\ \frac{3}{8} & \text{if } l=2,\ldots,L, m=0 \\ & \text{or } l=L+2,\ldots,K, m=0 \\ & \text{or } l=m=2,\ldots,L \\ & \text{or } l=m=L+2,\ldots,K \\ \frac{1}{8} & \text{if } l=2,\ldots,L, m=l-1 \\ & \text{or } l=L+2,\ldots,K, m=l-1 \\ & \text{or } l=2,\ldots,L, m=l+1 \\ & \text{or } l=L+2,\ldots,K, m=l+1 \\ & \text{or } l=K, m=1 \\ 0 & \text{otherwise} \end{cases},$$

where the smooth feature line is defined in connection with the edges between respective points $v_q(1)$ and $v_q(L+1)$ $(L+1 \le K)$ and vertex $v_q(0)$, $s_1$ is the parameter associated with the edge between point

$v_q(1)$ and vertex $v_q(0)$, $s_2$ is the parameter associated with the edge between point $v_q(L+1)$ and vertex $v_q(0)$, $s_3 = \frac{1}{2}(s_1 + s_2)$, and

$$\alpha(K) = \frac{5}{8} - \left( \frac{3 + 2\cos\left(\frac{2\pi}{K}\right)}{8} \right)^2 .$$

62 (original). A computer program product as defined in claim 61 in which the representation of the feature is defined by at least one limit point associated with the vertex, the feature representation generator module being configured to enable the computer to determine a position σ(q) of the limit point in accordance with

$$\sigma(q) = \sum_{i=0}^{K} \left( l_{LP}(s_1, s_2) \right)_i c^j(i) ,$$

where $l_{LP}(s_1,s_2)$ is a vector of limit point weight values defined by

$$l_{LP}(s_1, s_2) = v_{LP} \cdot S_{sc,T,K,L,LP}(s_1, s_2) ,$$

where

$$S_{sc,T,K,L,LP}(s_1, s_2) = \prod_{j=\infty}^{j_D} S_{sc,T,K,L}(s_1(j), s_2(j)) ,$$

where $S_{sc,T,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,T,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product, where $S_{sc,T,K,L,LP}(s_1,s_2)$ arguments $s_1$ and $s_2$ on the left-hand side refer to

the sharpness parameters a definition level of the smooth feature line and the subscript "LP" refers to "Limit Point," and

$$v_{LP} = \left( \frac{\omega(K)}{\varpi(K)+K}, \frac{1}{\varpi(K)+K}, \frac{1}{\varpi(K)+K}, \ldots, \frac{1}{\varpi(K)+K} \right),$$

where

$$\varpi(K) = \frac{3K}{8\,a(K)}.$$

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63 (original). A computer program product as defined in claim 62 in which the weight vector generator module is configured to enable the computer to generate an approximation for the limit point weight vector $l_{LP}$ using a polynomial approximation methodology.

64 (original). A computer program product as defined in claim 63 in which the weight vector generator module is configured to enable the computer to generate the approximation for the limit point weight vector $l_{LP}$ in accordance with the polynomial

$$(l_{LP})_i \approx b_{i0} + b_{i1}(s_1 + s_2) + b_{i2}(s_1^2 + s_2^2) + b_{i3}s_1s_2,$$

in a symmetric case, or the polynomial

$$(l_{LP})_i \approx b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_2^2 + b_{i5}s_1s_2,$$

in an asymmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

65 (original). A computer program product as defined in claim 64 in which weight vector generator module is configured to enable the computer to select values of $s_1$ and $s_2$ in accordance with

$$\left(s_1, s_2\right) = \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right) ,$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

66 (original). A computer program product as defined in claim 62 in which the weight vector generator module is configured to enable the computer to generate an approximation for the limit point weight vector $l_{LP}$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

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67 (original). A computer program product as defined in claim 66 in which the weight vector generator module is configured to enable the computer to perform the extrapolation approximation methodology such that M=3.

68 (original). A computer program product as defined in claim 67 in which the weight vector generator module is configured to enable the computer to generate the approximation for the limit point weight vector weight vector in accordance with

$$l_{LP} \approx \sum_{J=0}^{3} b_J l_{LP}(J) ,$$

where "J" is a predetermined integer and where

$$\left(l_{LP}(J)\left(s_1, s_2\right)\right)_m = \left(S_{sc,T,KL,LP}(J)\left(s_1, s_2\right)\right)_{1,m} ,$$

where

$$S_{sc,T,K,L,LP}(J)(s_1,s_2) \quad := \quad \prod_{j=J}^{0} S_{sc,T,K,L}\left(s_1(j),s_2(j)\right) \quad ,$$

with

$$S_{sc,T,K,L,LP}(0)(s_1,s_2) \quad := \quad I_{K+1} \quad ,$$

where $I_{K+1}$ is the "K+1" by "K+1" identity matrix, and where

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$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

69 (original). A computer program product as defined in claim 61 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being along the smooth feature line, the feature representation generator module being configured to enable the computer to determine the tangent vector $e_C(q)$ in accordance with

$$e_C(q) \quad = \quad \sum_{i=0}^{K} \left(l_C(s_1,s_2)\right)_i c^j(i) \quad ,$$

where $l_C(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_C = \lim_{J\to\infty} \frac{l_C(J)}{\|l_C(J)\|},$$

where $\|v\| = \sqrt{\sum_i v_i^2}$, that is, the Euclidean norm, and where

$$l_C(J) = (0,1,0,\ldots,-1,0,\ldots)\cdot \prod_{j=J}^{j_D} S_{sc,T,K,L}\left(s_1(j),s_2(j)\right),$$

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where two non-zero components of the row vector on the right hand side are a "one" at position "one" in the row vector, and a "negative one" at position $\frac{K}{2}+1$, and where $S_{sc,T,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,T,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product.

70 (original). A computer program product as defined in claim 69 in which the weight vector generator module is configured to enable the computer to generate the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

71 (original). A computer program product as defined in claim 70 in which the weight vector generator module is configured to enable the computer to generate the approximation for the tangent vector weight vector $l_C$ in accordance with the polynomial

$$\left(l_C\right)_i = b_{i0}\left(s_1 - s_2\right) + b_{i1}\left(s_1^2 - s_2^2\right) + b_{i2}\left(s_1^3 - s_2^3\right) + b_{i3}\left(s_1^2 s_2 - s_1 s_2^2\right),$$

in the anti-symmetric case, or the polynomial

$$\left(l_C\right)_i = b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2s_2 + b_{i8}s_1s_2^2 + b_{i9}s_2^3 ,$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

72 (original). A computer program product as defined in claim 71 in which weight vector generator module is configured to enable the computer to select values of $s_1$ and $s_2$ in accordance with

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$$\left(s_1, s_2\right) = \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right) ,$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

73 (original). A computer program product as defined in claim 69 in which the weight vector generator module is configured to enable the computer to generate an approximation for the tangent vector weight vector $l_C$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

74 (original). A computer program product as defined in claim 73 in which the weight vector generator module is configured to enable the computer to perform the extrapolation approximation methodology such that M=3.

75 (original). A computer program product as defined in claim 74 in which the weight vector generator module is configured to enable the computer to generate the approximation for the tangent vector weight vector $l_C$ in accordance with

$$l_C \approx \sum_{J=0}^{3} b_J l_C(J) \qquad ,$$

where "J" is a predetermined integer and where

$$l_C(J)(s_1, s_2) = d(K)^J v_C \cdot S_{sc,T,K,L,LP}(J)(s_1, s_2) \qquad ,$$

where vector $v_C$ is given by

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$$v_C = \left(0, \cos\frac{2\pi(0)}{K}, \cos\frac{2\pi(1)}{K}, \ldots, \cos\frac{2\pi(K-1)}{K}\right) \qquad ,$$

dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} \qquad ,$$

and

$$S_{sc,T,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,T,K,L}\left(s_1(j), s_2(j)\right) \qquad ,$$

with

$$S_{sc,T,K,L,LP}(0)(s_1, s_2) := I_{K+1} \qquad ,$$

where $I_{K+1}$ is the "K+1" by "K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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76 (original). A computer program product as defined in claim 61 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being across the smooth feature line, the feature representation generator module being configured to enable the computer to determine the tangent vector $e_C(q)$ in accordance with

$$e_S(q) = \sum_{i=0}^{K} \left(l_S(s_1, s_2)\right)_i c^J(i) ,$$

where $l_S(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_S = \lim_{j \to \infty} \frac{l_S(J)}{\|l_S(J)\|} ,$$

where $\|v\| = \sqrt{\sum_i v_i^2}$, that is, the Euclidean norm, where

$$l_S(J) = \left(0, \sin\frac{2\pi(0)}{K}, \sin\frac{2\pi(1)}{K}, \ldots, \sin\frac{2\pi(K-1)}{K}\right) \cdot \prod_{j=J}^{j_D} S_{sc,T,K,L}\left(s_1(j), s_2(j)\right) \quad ,$$

where $S_{sc,T,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,T,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product.

77 (original). A computer program product as defined in claim 76 in which the weight vector generator module is configured to enable the computer to generate the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

78 (original). A computer program product as defined in claim 77 in which the weight vector generator module is configured to enable the computer to generate the approximation for the tangent vector weight vector $l_S$ in accordance with the polynomial

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$$\left(l_S\right)_i = b_{i0}\left(s_1 - s_2\right) + b_{i1}\left(s_1^2 - s_2^2\right) + b_{i2}\left(s_1^3 - s_2^3\right) + b_{i3}\left(s_1^2 s_2 - s_1 s_2^2\right) \quad ,$$

in the anti-symmetric case, or the polynomial

$$\begin{aligned}\left(l_S\right)_i = \; & b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1 s_2 + \\ & b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2 s_2 + b_{i8}s_1 s_2^2 + b_{i9}s_2^3\end{aligned} \quad ,$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

79 (original). A computer program product as defined in claim 78 in which weight vector generator module is configured to enable the computer to select values of $s_1$ and $s_2$ in accordance with

$$(s_1, s_2) = \left( \cos\left( \frac{\left(i + \frac{1}{2}\right)\pi}{N} \right), \cos\left( \frac{\left(j + \frac{1}{2}\right)\pi}{N} \right) \right),$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

80 (original). A computer program product as defined in claim 75 in which the weight vector generator module is configured to enable the computer to generate an approximation for the tangent vector weight vector $l_S$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

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81 (original). A computer program product as defined in claim 80 in which the weight vector generator module is configured to enable the computer to perform the extrapolation approximation methodology such that M=3.

82 (original). A computer program product as defined in claim 81 in which the weight vector generator module is configured to enable the computer to generate the approximation for the limit point weight vector weight vector in accordance with

$$l_S \approx \sum_{J=0}^{3} b_J l_S(J),$$

where "J" is a predetermined integer and where

$$l_S(J)(s_1, s_2) = d(K)^J v_S \cdot S_{sc,T,K,L,LP}(J)(s_1, s_2),$$

where vector $v_S$ is given by

$$v_S = \left(0, \sin\frac{2\pi(0)}{K}, \sin\frac{2\pi(1)}{K}, \ldots, \sin\frac{2\pi(K-1)}{K}\right) ,$$

dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} ,$$

and

$$S_{sc,T,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,T,K,L}\left(s_1(j), s_2(j)\right) ,$$

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with

$$S_{sc,T,K,L,LP}(0)(s_1, s_2) := I_{K+1} ,$$

where $I_{K+1}$ is the "K+1" by "K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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83 (original). A computer program product as defined in claim 56 in which the mesh comprises a quadrilateral mesh in which, at a selected level "j," vertex $v_q(0)$ is at position $c^j(0)$ and neighboring points $v_q(k)$, k=1,...,2K are at respective positions $c^j(k)$, and in which the weight vector generator module is configured to enable the computer to make use of a parameterized subdivision rule $S_{sc,Q,K,L}$ that relates the position $c^{j+1}(0)$ of the vertex $v_q(0)$ and positions $c^{j+1}(k)$ of neighboring points $v_q(k)$ at the next higher level "j+1" as follows

$$c^{j+1} = S_{sc,T,K,L}\, c^j ,$$

where subdivision rule $S_{sc,Q,K,L}$ is given by

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\left(S_{sc,Q,K,L}(s_1,s_2)\right)_{l,m} = \begin{cases}
(1-s_3)\left(1-\frac{7}{4K}\right)+\frac{3}{4}s_3 & \textit{if } l=0, m=0 \\
(1-s_3)\left(\frac{3}{2K^2}\right)+\frac{1}{8}s_3 & \textit{if } l=0, m=1 \textit{ or } L+1 \\
(1-s_3)\left(\frac{3}{2K^2}\right) & \textit{if } l=0, m=2,\ldots,L \\
 & \textit{or } l=0, m=L+2,\ldots,K \\
(1-s_3)\left(\frac{1}{4K^2}\right) & \textit{if } l=0, m=K+1,\ldots,2K \\
\frac{3}{8}(1-s_2)+\frac{1}{2}s_2 & \textit{if } l=1, m=0 \textit{ or } 1 \\
\frac{1}{16}(1-s_2) & \textit{if } l=L+1, m=2, K, \\
 & \quad K+1 \textit{ or } 2K \\
\frac{3}{8}(1-s_1)+\frac{1}{2}s_1 & \textit{if } l=L+1, m=0 \textit{ or } L+1 \\
\frac{1}{16}(1-s_1) & \textit{if } l=L+1, m=L, L+2, \\
 & \quad K+1 \textit{ or } K+L+1 \\
\frac{3}{8} & \textit{if } l=2,\ldots,L, m=0 \\
 & \textit{or } l=L+2,\ldots,K, m=0 \\
 & \textit{or } l=m=2,\ldots,L \\
 & \textit{or } l=m=L+2,\ldots K \\
\frac{1}{16} & \textit{if } l=2,\ldots,L, m=l-1 \\
 & \textit{or } l=2,\ldots,L, m=l+1 \\
 & \textit{or } l=2,\ldots,L, m=K+l-1 \\
 & \textit{or } l=2,\ldots,L, m=K+l \\
 & \textit{or } l=L+2,\ldots,K, m=l-1 \\
 & \textit{or } l=L+2,\ldots,K-1, m=l+1 \\
 & \textit{or } l=K, m=1 \\
 & \textit{or } l=L+2,\ldots,K, m=K+l-1 \\
 & \textit{or } l=L+2,\ldots,K, m=K+l \\
\frac{1}{4} & \textit{if } l=K+1,\ldots,2K-1, m=0, \\
 & \quad l-K, l-K+1 \textit{ or } l \\
 & \textit{or } l=2K, m=0, K, 1 \textit{ or } 2K \\
0 & \textit{otherwise}
\end{cases},
$$

where the smooth feature line is defined in connection with the edges between respective points $v_q(1)$ and $v_q(L+1)$ $(L+1 \leq 2K)$ and vertex $v_q(0)$, $s_1$ is the parameter associated with the edge between point $v_q(1)$ and vertex $v_q(0)$, $s_2$ is the parameter associated with the edge between point $v_q(L+1)$ and vertex $v_q(0)$, and $s_3 = \frac{1}{2}\left(s_1 + s_2\right)$.

84 (original). A computer program product as defined in claim 83 in which the representation of the feature is defined by at least one limit point associated with the vertex, the feature representation generator module being configured to enable the computer to determine a position $\sigma(q)$ of the limit point in accordance with

$$\sigma(q) \quad = \quad \sum_{i=0}^{2K}\left(l_{LP}\left(s_1, s_2\right)\right)_i c^j(i) \qquad ,$$

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where $l_{LP}(s_1,s_2)$ is a vector of limit point weight values defined by

$$l_{LP}\left(s_1, s_2\right) \quad = \quad v_{LP} \cdot S_{sc,Q,K,L,LP}\left(s_1, s_2\right) \qquad ,$$

where

$$S_{sc,Q,K,L,LP}\left(s_1, s_2\right) \quad = \quad \prod_{j=\infty}^{j_D} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) \qquad ,$$

where $S_{sc,Q,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,Q,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product, where $S_{sc,Q,K,L,LP}(s_1,s_2)$ arguments $s_1$ and $s_2$ on the left-hand side refer to the sharpness parameters a definition level of the smooth feature line and the subscript "LP" refers to "Limit Point," and

$$v_{LP} \quad = \quad \frac{1}{K(K+5)}\left(K^2, 4, \ldots, 4, 1, \ldots, 1\right) \qquad .$$

85 (original). A computer program product as defined in claim 84 in which the weight vector generator module is configured to enable the computer to generate an approximation for the limit point weight vector $l_{LP}$ using a polynomial approximation methodology.

86 (original). A computer program product as defined in claim 85 in which the weight vector generator module is configured to enable the computer to generate the approximation for the limit point weight vector $l_{LP}$ in accordance with the polynomial

$$\left(l_{LP}\right)_i \approx b_{i0} + b_{i1}\left(s_1 + s_2\right) + b_{i2}\left(s_1^2 + s_2^2\right) + b_{i3}s_1s_2 ,$$

in a symmetric case, or the polynomial

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$$\left(l_{LP}\right)_i \approx b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + b_{i5}s_2^2 ,$$

in an asymmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

87 (original). A computer program product as defined in claim 86 in which weight vector generator module is configured to enable the computer to select values of $s_1$ and $s_2$ in accordance with

$$\left(s_1, s_2\right) = \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right) ,$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

88 (original). A computer program product as defined in claim 84 in which the weight vector generator module is configured to enable the computer to generate an approximation for the limit

point weight vector $l_{LP}$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

89 (original). A computer program product as defined in claim 88 in which the weight vector generator module is configured to enable the computer to perform the extrapolation approximation methodology such that M=3.

90 (original). A computer program product as defined in claim 89 in which the weight vector generator module is configured to enable the computer to generate the approxiation for the limit point weight vector weight vector in accordance with

$$l_{LP} \approx \sum_{J=0}^{3} b_J l_{LP}(J) ,$$

where "J" is a predetermined integer and where

$$\left(l_{LP}(J)(s_1, s_2)\right)_m = \left(S_{sc,Q,K.L,LP}(J)(s_1, s_2)\right)_{1,m} ,$$

where

$$S_{sc,Q,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

with

$$S_{sc,Q,K,L,LP}(0)(s_1, s_2) := I_{2K+1} ,$$

where $I_{2K+1}$ is the "2K+1" by "2K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

91 (original). A computer program product as defined in claim 83 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being along the smooth feature line, the feature representation generator module being configured to enable the computer to determine the tangent vector $e_C(q)$ in accordance with

$$e_C(q) = \sum_{i=0}^{2K} \left(l_C(s_1, s_2)\right)_i c^j(i) ,$$

where $l_C(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_C(s_1, s_2) = d(K)^K v_c \cdot S_{sc,Q,K,L,LP}\left(s_1(j), s_2(j)\right) ,$$

where

$$S_{sc,Q,K,L,LP}(s_1, s_2) = \prod_{j=\infty}^{j_D} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

and vector $v_C$ is defined as

$$(v_c)_i = \begin{cases} 0 & if\ i = 0 \\ A_k \cos\dfrac{2\pi(i-1)}{K} & if\ i = 1,\ldots,K \\ \cos\dfrac{2\pi(i-K-1)}{K} + \cos\dfrac{2\pi(i-K)}{K} & if\ i = K+1,\ldots,2K \end{cases},$$

where

$$A_K = 1 + \cos\left(\frac{2\pi}{K}\right) + \cos\left(\frac{\pi}{K}\right)\sqrt{2\left(9 + \cos\frac{2\pi}{K}\right)},$$

and where dilation factor d(K) is given by

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$$d(K) = \frac{1}{\dfrac{A_K}{16} + \dfrac{1}{4}}.$$

92 (original). A computer program product as defined in claim 91 in which the weight vector generator module is configured to enable the computer to generate the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

93 (original). A computer program product as defined in claim 92 in which the weight vector generator module is configured to enable the computer to generate the approximation for the tangent vector weight vector $l_C$ in accordance with the polynomial

$$(l_C)_i \approx b_{i0}(s_1 - s_2) + b_{i1}(s_1^2 - s_2^2) + b_{i2}(s_1^3 - s_2^3) + b_{i3}(s_1^2 s_2 - s_1 s_2^2),$$

in the anti-symmetric case, or the polynomial

$$(l_C)_i \approx b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2s_2 + b_{i8}s_1s_2^2 + b_{i9}s_2^3 ,$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

94 (original). A computer program product as defined in claim 93 in which weight vector generator module is configured to enable the computer to select values of $s_1$ and $s_2$ in accordance with

$$(s_1, s_2) = \left( \cos\left( \frac{\left(i + \frac{1}{2}\right)\pi}{N} \right), \cos\left( \frac{\left(j + \frac{1}{2}\right)\pi}{N} \right) \right) ,$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

95 (original). A computer program product as defined in claim 91 in which the weight vector generator module is configured to enable the computer to generate an approximation for the tangent vector weight vector $l_C$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

96 (original). A computer program product as defined in claim 95 in which the weight vector generator module is configured to enable the computer to perform the extrapolation approximation methodology such that M=3.

97 (original). A computer program product as defined in claim 96 in which the weight vector generator module is configured to enable the computer to generate the approximation for the tangent vector weight vector $l_C$ in accordance with

$$l_C \approx \sum_{J=0}^{3} b_J l_C(J) \quad ,$$

where "J" is a predetermined integer and where

$$l_C(J)(s_1, s_2) = d(K)^J v_C \cdot S_{sc,Q,K,L,LP}(J)(s_1, s_2) \quad ,$$

where vector $v_C$ is given by

$$v_C = \left(0, \cos\frac{2\pi(0)}{K}, \cos\frac{2\pi(1)}{K}, \ldots, \cos\frac{2\pi(K-1)}{K}\right) \quad ,$$

dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} \quad ,$$

and

$$S_{sc,Q,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,Q,K,L}(s_1(j), s_2(j)) \quad ,$$

with

$$S_{sc,Q,K,L,LP}(0)(s_1, s_2) := I_{2K+1} \quad ,$$

where $I_{K+1}$ is the "2K+1" by "2K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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98 (original). A computer program product as defined in claim 83 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being across the smooth feature line, the feature representation generator module being configured to enable the computer to determine the tangent vector $e_C(q)$ in accordance with

$$e_S(q) = \sum_{i=0}^{2K} \left(l_S(s_1, s_2)\right)_i c^j(i) \quad ,$$

where $l_C(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_S(s_1, s_2) = d(K)^K v_S \cdot S_{sc,Q,K,L,LP}\left(s_1(j), s_2(j)\right) \quad ,$$

where

$$S_{sc,Q,K,L,LP}(s_1, s_2) = \prod_{j=\infty}^{J_D} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) \quad ,$$

and vector $v_C$ is defined as

$$(v_S)_i = \begin{cases} 0 & if\ i = 0 \\ A_k \sin\dfrac{2\pi(i-1)}{K} & if\ i = 1,\ldots,K \\ \sin\dfrac{2\pi(i-K-1)}{K} + \sin\dfrac{2\pi(i-K)}{K} & if\ i = K+1,\ldots,2K \end{cases},$$

where

$$A_K = 1 + \cos\left(\frac{2\pi}{K}\right) + \cos\left(\frac{\pi}{K}\right)\sqrt{2\left(9+\cos\frac{2\pi}{K}\right)},$$

and where dilation factor d(K) is given by

$$d(K) = \frac{1}{\dfrac{A_K}{16} + \dfrac{1}{4}}.$$

99 (original). A computer program product as defined in claim 98 in which the weight vector generator module is configured to enable the computer to generate the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

100 (original). A computer program product as defined in claim 99 in which the weight vector generator module is configured to enable the computer to generate the approximation for the tangent vector weight vector $l_S$ in accordance with the polynomial

$$(l_S)_i = b_{i0}(s_1 - s_2) + b_{i1}(s_1^2 - s_2^2) + b_{i2}(s_1^3 - s_2^3) + b_{i3}(s_1^2 s_2 - s_1 s_2^2),$$

in the anti-symmetric case, or the polynomial

$$\begin{aligned}(l_S)_i \;&=\; b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + \\ &\quad b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2s_2 + b_{i8}s_1s_2^2 + b_{i9}s_2^3\end{aligned},$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

101 (original). A computer program product as defined in claim 100 in which weight vector generator module is configured to enable the computer to select values of $s_1$ and $s_2$ in accordance with

$$(s_1, s_2) \;=\; \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right),$$

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where "N" is a selected integer, and indices i,j=0,...,N-1.

102 (original). A computer program product as defined in claim 98 in which the weight vector generator module is configured to enable the computer to generate an approximation for the tangent vector weight vector $l_S$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

103 (original). A computer program product as defined in claim 102 in which the weight vector generator module is configured to enable the computer to perform the extrapolation approximation methodology such that M=3.

104 (original). A computer program product as defined in claim 103 in which the weight vector generator module is configured to enable the computer to generate the approximation for the limit point weight vector weight vector in accordance with

$$l_S \approx \sum_{J=0}^{3} b_J l_S(J) \quad ,$$

where "J" is a predetermined integer and where

$$l_S(J)(s_1, s_2) = d(K)^J v_S \cdot S_{sc,Q,K,L,LP}(J)(s_1, s_2) \quad ,$$

where vector $v_S$ is given by

$$v_S = \left(0, \sin\frac{2\pi(0)}{K}, \sin\frac{2\pi(1)}{K}, \ldots, \sin\frac{2\pi(K-1)}{K}\right) \quad ,$$

dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} \quad ,$$

and

$$S_{sc,Q,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) \quad ,$$

with

$$S_{sc,Q,K,L,LP}(0)(s_1, s_2) := I_{2K+1} \quad ,$$

where $I_{2K+1}$ is the "2K+1" by "2K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

105 (currently amended). A method for generating a representation of a feature in a surface defined by a mesh representation, the mesh comprising at a selected level a plurality of points including at least one point<u>, referred to as a vertex,</u> connected to a plurality of neighboring points by respective edges, the feature being defined in connection with the vertex and at least one of the neighboring points and the edge interconnecting the vertex and the at least one of the neighboring points in the mesh representation, the method comprising:

A. a weight vector generator step configured to generate at least one weight vector based on a parameterized subdivision rule defined at a plurality of levels, for which a value of at least one parameter differs at at least two levels in the mesh; and

B. a feature representation generator step configured to use the at least one weight vector and positions of the vertex and the neighboring points to generate the representation of the feature.

106 (currently amended). A method as defined in claim 105 in which <u>the</u> weight vector generator step includes the step of making use of values of the at least one parameter that differ at at least two levels are related by a selected mathematical function.

107 (original). A method as defined in claim 105 in which the feature is a smooth feature line.

108 (currently amended). A method as defined in claim 107 in which the smooth feature line is defined in connection with the vertex and two neighboring points and edges interconnecting the vertex and the respective neighboring points, the weight vector generator step ~~includes~~ including the step of making use of the parameterized subdivision rule having a parameter value associated with each of the edges along which the smooth feature line is defined.

109 (original). A method as defined in claim 108 in which the weight vector generator step includes the step of making use of parameters associated with the edges along which the smooth feature line is defined whose values are the same.

110 (original). A method as defined in claim 109 in which the weight vector generator step includes the step of making use of the parameters that are in relation to a subdivision rule that, in turn, reflects a sharp crease along the edges along which the smooth feature line is defined, the values of the parameters being defined in the interval [0,1], where higher values define a sharper crease, the values of the parameters at a lower level being related to the values of the parameters at a higher level being related by

$$s(j+1) = \left(s(j)\right)^2 ,$$

where s(j) represents the values of the parameters at level "j" and s(j+1) represents the values of the parameters at the higher level "j+1."

111 (original). A method as defined in claim 108 in which the weight vector generator step includes the step of making use of parameters associated with the edges along which the smooth feature line is defined whose values differ.

112 (original). A method as defined in claim 111 in which the weight vector generator step includes the step of making use of the parameters that are in relation to a subdivision rule that, in turn, reflects a sharp crease along the edges along which the smooth feature line is defined, the values of the

parameters being defined in the interval [0,1], where higher values define a sharper crease, the values of the parameters at a lower level being related to the values of the parameters at a higher level being related by

$$s_1(j+1) = \left(\frac{3}{4}s_1(j)+\frac{1}{4}s_2(j)\right)^2 ,$$

and

$$s_2(j+1) = \left(\frac{1}{4}s_1(j)+\frac{3}{4}s_2(j)\right)^2 ,$$

where $s_1(j)$ and $s_2(j)$ represent the values of the parameters associated with the respective edges at level "j," and $s_1(j+1)$ and $s_2(j+1)$ represent the values of the parameters associated with the respective edges at the higher level "j+1."

113 (original). A method as defined in claim 108 in which the mesh comprises a triangular mesh in which, at a selected level "j," vertex $v_q(0)$ is at position $c^j(0)$ and neighboring points $v_q(k)$, k=1,...,K are at respective positions $c^j(k)$, and in which the weight vector generator step includes the step of making use of a parameterized subdivision rule $S_{sc,T,K,L}$ that relates the position $c^{j+1}(0)$ of the vertex $v_q(0)$ and positions $c^{j+1}(k)$ of neighboring points $v_q(k)$ at the next higher level "j+1" as follows

$$c^{j+1} = S_{sc,T,K,L}\, c^j ,$$

where subdivision rule $S_{sc,T,K,L}$ is given by

$$
\left(S_{sc,T,K,L}(s_1,s_2)\right)_{l,m} = \begin{cases}
(1-s_3)(1-a(K)) + \frac{3}{4}s_3 & \mathit{if}\ l=0, m=0 \\
(1-s_3)\frac{a(K)}{K} + \frac{1}{8}s_3 & \mathit{if}\ l=0, m=1\ \mathit{or}\ L+1 \\
(1-s_3)\frac{a(K)}{K} & \mathit{if}\ l=0, m=2,\ldots,L \\
 & \mathit{or}\ l=0, m=L+2,\ldots,K \\
\frac{3}{8}+\frac{1}{8}s_2 & \mathit{if}\ l=1, m=0\ \mathit{or}\ 1 \\
\frac{3}{8}+\frac{1}{8}s_1 & \mathit{if}\ l=L+1, m=0\ \mathit{or}\ L+1 \\
\frac{1}{8}(1-s_2) & \mathit{if}\ l=1, m=2\ \mathit{or}\ K \\
\frac{1}{8}(1-s_1) & \mathit{if}\ l=L+1, m=L\ \mathit{or}\ L+2 \\
\frac{3}{8} & \mathit{if}\ l=2,\ldots,L, m=0 \\
 & \mathit{or}\ l=L+2,\ldots,K, m=0 \\
 & \mathit{or}\ l=m=2,\ldots,L \\
 & \mathit{or}\ l=m=L+2,\ldots,K \\
\frac{1}{8} & \mathit{if}\ l=2,\ldots,L, m=l-1 \\
 & \mathit{or}\ l=L+2,\ldots,K, m=l-1 \\
 & \mathit{or}\ l=2,\ldots,L, m=l+1 \\
 & \mathit{or}\ l=L+2,\ldots,K, m=l+1 \\
 & \mathit{or}\ l=K, m=1 \\
0 & \mathit{otherwise}
\end{cases},
$$

where the smooth feature line is defined in connection with the edges between respective points $v_q(1)$ and $v_q(L+1)$ $(L+1 \leq K)$ and vertex $v_q(0)$, $s_1$ is the parameter associated with the edge between point

$v_q(1)$ and vertex $v_q(0)$, $s_2$ is the parameter associated with the edge between point $v_q(L+1)$ and vertex $v_q(0)$, $s_3 = \frac{1}{2}\left(s_1 + s_2\right)$, and

$$\alpha(K) = \frac{5}{8} - \left( \frac{3 + 2\cos\left(\frac{2\pi}{K}\right)}{8} \right)^2$$

114 (original). A method as defined in claim 113 in which the representation of the feature is defined by at least one limit point associated with the vertex, the feature representation generator step includes the step of determining a position $\sigma(q)$ of the limit point in accordance with

$$\sigma(q) = \sum_{i=0}^{K} \left(l_{LP}\left(s_1, s_2\right)\right)_i c^j(i) ,$$

where $l_{LP}(s_1,s_2)$ is a vector of limit point weight values defined by

$$l_{LP}\left(s_1, s_2\right) = v_{LP} \cdot S_{sc,T,K,L,LP}\left(s_1, s_2\right) ,$$

where

$$S_{sc,T,K,L,LP}\left(s_1, s_2\right) = \prod_{j=\infty}^{j_D} S_{sc,T,K,L}\left(s_1(j), s_2(j)\right) ,$$

where $S_{sc,T,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,T,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product, where $S_{sc,T,K,L,LP}(s_1,s_2)$ arguments $s_1$ and $s_2$ on the left-hand side refer to the sharpness parameters a definition level of the smooth feature line and the subscript "LP" refers to "Limit Point," and

$$v_{LP} = \left( \frac{\omega(K)}{\varpi(K)+K}, \frac{1}{\varpi(K)+K}, \frac{1}{\varpi(K)+K}, \ldots, \frac{1}{\varpi(K)+K} \right) ,$$

where

$$\varpi(K) = \frac{3K}{8\,a(K)} .$$

115 (original). A method as defined in claim 114 in which the weight vector generator step includes the step of generating an approximation for the limit point weight vector $l_{LP}$ using a polynomial approximation methodology.

116 (original). A method as defined in claim 115 in which the weight vector generator step includes the step of generating the approximation for the limit point weight vector $l_{LP}$ in accordance with the polynomial

$$\left(l_{LP}\right)_i \approx b_{i0} + b_{i1}\left(s_1 + s_2\right) + b_{i2}\left(s_1^2 + s_2^2\right) + b_{i3}s_1s_2 ,$$

in a symmetric case, or the polynomial

$$\left(l_{LP}\right)_i \approx b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_2^2 + b_{i5}s_1s_2 ,$$

in an asymmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

117 (original). A method as defined in claim 116 in which weight vector generator step includes the step of selecting values of $s_1$ and $s_2$ in accordance with

$$\left(s_1, s_2\right) = \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right) ,$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

118 (original). A method as defined in claim 114 in which the weight vector generator step includes the step of generating an approximation for the limit point weight vector $l_{LP}$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point ~~x=0.~~

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119 (original). A method as defined in claim 118 in which the weight vector generator step includes the step of performing the extrapolation approximation methodology such that M=3.

120 (original). A method as defined in claim 119 in which the weight vector generator step includes the step of generating the approximation for the limit point weight vector weight vector in accordance with

$$l_{LP} \approx \sum_{J=0}^{3} b_J l_{LP}(J) ,$$

where "J" is a predetermined integer and where

$$\left(l_{LP}(J)\left(s_1, s_2\right)\right)_m = \left(S_{sc,T,K,L,LP}(J)\left(s_1, s_2\right)\right)_{1,m} ,$$

where

$$S_{sc,T,K,L,LP}(J)(s_1,s_2) \quad := \quad \prod_{j=J}^{0} S_{sc,T,K,L}\big(s_1(j),s_2(j)\big) \qquad ,$$

with

$$S_{sc,T,K,L,LP}(0)(s_1,s_2) \quad := \quad I_{K+1} \qquad ,$$

where $I_{K+1}$ is the "K+1" by "K+1" identity matrix, and where

$$b_0 \quad = \quad \frac{-135}{120015}$$

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$$b_1 \quad = \quad \frac{1270}{120015}$$

$$b_2 \quad = \quad \frac{-12192}{120015}$$

$$b_3 \quad = \quad \frac{131072}{120015}$$

121 (original). A method as defined in claim 9 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being along the smooth feature line, the feature representation generator step includes the step of determining the tangent vector $e_C(q)$ in accordance with

$$e_C(q) \quad = \quad \sum_{i=0}^{K} \big(l_C(s_1,s_2)\big)_i c^j(i) \qquad ,$$

where $l_C(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_C \quad = \quad \lim_{j\to\infty} \frac{l_C(J)}{\left\| l_C(J) \right\|} \qquad ,$$

where $\|v\| = \sqrt{\sum_i v_i^2}$, that is, the Euclidean norm, and where

$$l_C(J) \quad = \quad (0,1,0,\ldots,-1,0,\ldots)\cdot \prod_{j=J}^{j_D} S_{sc,T,K,L}\big(s_1(j),s_2(j)\big) \qquad ,$$

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where two non-zero components of the row vector on the right hand side are a "one" at position "one" in the row vector, and a "negative one" at position $\frac{K}{2}+1$, and where $S_{sc,T,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,T,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product.

122 (original). A method as defined in claim 121 in which the weight vector generator step includes the step of generating the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

123 (original). A method as defined in claim 122 in which the weight vector generator step includes the step of generating the approximation for the tangent vector weight vector $l_C$ in accordance with the polynomial

$$\left(l_C\right)_i \quad = \quad b_{i0}\left(s_1 - s_2\right) + b_{i1}\left(s_1^2 - s_2^2\right) + b_{i2}\left(s_1^3 - s_2^3\right) + b_{i3}\left(s_1^2 s_2 - s_1 s_2^2\right) \qquad ,$$

in the anti-symmetric case, or the polynomial

$$
\begin{aligned}
\left(l_C\right)_i \quad = \quad & b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + \\
& b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2s_2 + b_{i8}s_1s_2^2 + b_{i9}s_2^3
\end{aligned}
,
$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

124 (original). A method as defined in claim 123 in which weight vector generator step includes the step of selecting values of $s_1$ and $s_2$ in accordance with

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$$
\left(s_1, s_2\right) = \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right),
$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

125 (original). A method as defined in claim 121 in which the weight vector generator step includes the step of generating an approximation for the tangent vector weight vector $l_C$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

126 (original). A method as defined in claim 125 in which the weight vector generator step includes the step of performing the extrapolation approximation methodology such that M=3.

127 (original). A method as defined in claim 126 in which the weight vector generator step includes the step of generating the approximation for the tangent vector weight vector $l_C$ in accordance with

$$l_C \approx \sum_{J=0}^{3} b_J l_C(J) \quad ,$$

where "J" is a predetermined integer and where

$$l_C(J)(s_1,s_2) = d(K)^J v_C \cdot S_{sc,T,K,L,LP}(J)(s_1,s_2) \quad ,$$

where vector $v_C$ is given by

$$v_C = \left(0, \cos\frac{2\pi(0)}{K}, \cos\frac{2\pi(1)}{K}, \ldots, \cos\frac{2\pi(K-1)}{K}\right) \quad ,$$

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dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} \quad ,$$

and

$$S_{sc,T,K,L,LP}(J)(s_1,s_2) := \prod_{j=J}^{0} S_{sc,T,K,L}\left(s_1(j), s_2(j)\right) \quad ,$$

with

$$S_{sc,T,K,L,LP}(0)(s_1,s_2) := I_{K+1} \quad ,$$

where $I_{K+1}$ is the "K+1" by "K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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128 (original). A method as defined in claim 9 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being across the smooth feature line, the feature representation generator step includes the step of determining the tangent vector $e_C(q)$ in accordance with

$$e_S(q) = \sum_{i=0}^{K} \left(l_S(s_1, s_2)\right)_i c^j(i) ,$$

where $l_S(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_S = \lim_{J \to \infty} \frac{l_S(J)}{\left\| l_S(J) \right\|} ,$$

where $\|v\| = \sqrt{\sum_i v_i^2}$, that is, the Euclidean norm, where

$$l_S(J) = \left(0, \sin\frac{2\pi(0)}{K}, \sin\frac{2\pi(1)}{K}, \ldots, \sin\frac{2\pi(K-1)}{K}\right) \cdot \prod_{j=J}^{j_D} S_{sc,T,K,L}\left(s_1(j), s_2(j)\right) \quad ,$$

where $S_{sc,T,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,T,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product.

129 (original). A method as defined in claim 128 in which the weight vector generator step includes the step of generating the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

130 (original). A method as defined in claim 129 in which the weight vector generator step includes the step of generating the approximation for the tangent vector weight vector $l_S$ in accordance with the polynomial

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$$(l_S)_i = b_{i0}(s_1 - s_2) + b_{i1}(s_1^2 - s_2^2) + b_{i2}(s_1^3 - s_2^3) + b_{i3}(s_1^2 s_2 - s_1 s_2^2) \quad ,$$

in the anti-symmetric case, or the polynomial

$$\begin{aligned}(l_S)_i = {} & b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1 s_2 + \\ & b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2 s_2 + b_{i8}s_1 s_2^2 + b_{i9}s_2^3 \end{aligned} \quad ,$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

131 (original). A method as defined in claim 130 in which weight vector generator step includes the step of selecting values of $s_1$ and $s_2$ in accordance with

$$(s_1, s_2) = \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right),$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

132 (original). A method as defined in claim 127 in which the weight vector generator step includes the step of generating an approximation for the tangent vector weight vector $l_S$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

133 (original). A method as defined in claim 132 in which the weight vector generator step includes the step of performing the extrapolation approximation methodology such that M=3.

134 (original). A method as defined in claim 133 in which the weight vector generator step includes the step of generating the approximation for the limit point weight vector weight vector in accordance with

$$l_S \approx \sum_{J=0}^{3} b_J l_S(J),$$

where "J" is a predetermined integer and where

$$l_S(J)(s_1, s_2) = d(K)^J v_S \cdot S_{sc,T,K,L,LP}(J)(s_1, s_2),$$

where vector $v_S$ is given by

$$v_S = \left(0, \sin\frac{2\pi(0)}{K}, \sin\frac{2\pi(1)}{K}, \ldots, \sin\frac{2\pi(K-1)}{K}\right) ,$$

dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} ,$$

and

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$$S_{sc,T,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,T,K,L}(s_1(j), s_2(j)) ,$$

with

$$S_{sc,T,K,L,LP}(0)(s_1, s_2) := I_{K+1} ,$$

where $I_{K+1}$ is the "K+1" by "K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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135 (original). A method as defined in claim 108 in which the mesh comprises a quadrilateral mesh in which, at a selected level "j," vertex $v_q(0)$ is at position $c^j(0)$ and neighboring points $v_q(k)$, k=1,...,2K are at respective positions $c^j(k)$, and in which the weight vector generator step includes the step of making use of a parameterized subdivision rule $S_{sc,Q,K,L}$ that relates the position $c^{j+1}(0)$ of the vertex $v_q(0)$ and positions $c^{j+1}(k)$ of neighboring points $v_q(k)$ at the next higher level "j+1" as follows

$$c^{j+1} = S_{sc,T,K,L}\, c^j \quad ,$$

where subdivision rule $S_{sc,Q,K,L}$ is given by

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$$\left(S_{sc,Q,K,L}(s_1,s_2)\right)_{l,m} = \begin{cases} (1-s_3)\left(1-\frac{7}{4K}\right)+\frac{3}{4}s_3 & if\ l=0, m=0 \\ (1-s_3)\left(\frac{3}{2K^2}\right)+\frac{1}{8}s_3 & if\ l=0, m=1\ or\ L+1 \\ (1-s_3)\left(\frac{3}{2K^2}\right) & if\ l=0, m=2,\ldots,L \\ & or\ l=0, m=L+2,\ldots,K \\ (1-s_3)\left(\frac{1}{4K^2}\right) & if\ l=0, m=K+1,\ldots,2K \\ \frac{3}{8}(1-s_2)+\frac{1}{2}s_2 & if\ l=1, m=0\ or\ 1 \\ \frac{1}{16}(1-s_2) & if\ l=L+1, m=2, K, \\ & \quad K+1\ or\ 2K \\ \frac{3}{8}(1-s_1)+\frac{1}{2}s_1 & if\ l=L+1, m=0\ or\ L+1 \\ \frac{1}{16}(1-s_1) & if\ l=L+1, m=L, L+2, \\ & \quad K+1\ or\ K+L+1 \\ \frac{3}{8} & if\ l=2,\ldots,L, m=0 \\ & or\ l=L+2,\ldots,K, m=0 \\ & or\ l=m=2,\ldots,L \\ & or\ l=m=L+2,\ldots K \\ \frac{1}{16} & if\ l=2,\ldots,L, m=l-1 \\ & or\ l=2,\ldots,L, m=l+1 \\ & or\ l=2,\ldots,L, m=K+l-1 \\ & or\ l=2,\ldots,L, m=K+l \\ & or\ l=L+2,\ldots,K, m=l-1 \\ & or\ l=L+2,\ldots,K-1, m=l+1 \\ & or\ l=K, m=1 \\ & or\ l=L+2,\ldots,K, m=K+l-1 \\ & or\ l=L+2,\ldots,K, m=K+l \\ \frac{1}{4} & if\ l=K+1,\ldots,2K-1, m=0, \\ & \quad l-K, l-K+1\ or\ l \\ & or\ l=2K, m=0, K, 1\ or\ 2K \\ 0 & otherwise \end{cases},$$

where the smooth feature line is defined in connection with the edges between respective points $v_q(1)$ and $v_q(L+1)$ $(L+1 \leq 2K)$ and vertex $v_q(0)$, $s_1$ is the parameter associated with the edge between point $v_q(1)$ and vertex $v_q(0)$, $s_2$ is the parameter associated with the edge between point $v_q(L+1)$ and vertex $v_q(0)$, and $s_3 = \frac{1}{2}\left(s_1 + s_2\right)$.

136 (original). A method as defined in claim 135 in which the representation of the feature is defined by at least one limit point associated with the vertex, the feature representation generator step includes the step of determining a position $\sigma(q)$ of the limit point in accordance with

$$\sigma(q) = \sum_{i=0}^{2K} \left(l_{LP}(s_1, s_2)\right)_i c^j(i) ,$$

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where $l_{LP}(s_1,s_2)$ is a vector of limit point weight values defined by

$$l_{LP}(s_1, s_2) = v_{LP} \cdot S_{sc,Q,K,L,LP}(s_1, s_2) ,$$

where

$$S_{sc,Q,K,L,LP}(s_1, s_2) = \prod_{j=\infty}^{j_D} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

where $S_{sc,Q,K,L}(s_1(j),s_2(j))$ corresponds to $S_{sc,Q,K,L}$ for sharpness parameters corresponding to the "j-th" level in the matrix product, where $S_{sc,Q,K,L,LP}(s_1,s_2)$ arguments $s_1$ and $s_2$ on the left-hand side refer to the sharpness parameters a definition level of the smooth feature line and the subscript "LP" refers to "Limit Point," and

$$v_{LP} = \frac{1}{K(K+5)}\left(K^2, 4, \ldots, 4, 1, \ldots, 1\right) .$$

137 (original). A method as defined in claim 136 in which the weight vector generator step includes the step of generating an approximation for the limit point weight vector $l_{LP}$ using a polynomial approximation methodology.

138 (original). A method as defined in claim 137 in which the weight vector generator step includes the step of generating the approximation for the limit point weight vector $l_{LP}$ in accordance with the polynomial

$$\left(l_{LP}\right)_i \approx b_{i0} + b_{i1}\left(s_1 + s_2\right) + b_{i2}\left(s_1^2 + s_2^2\right) + b_{i3}s_1s_2 ,$$

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in a symmetric case, or the polynomial

$$\left(l_{LP}\right)_i \approx b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + b_{i5}s_2^2 ,$$

in an asymmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

139 (original). A method as defined in claim 138 in which weight vector generator step includes the step of selecting values of $s_1$ and $s_2$ in accordance with

$$\left(s_1, s_2\right) = \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right) ,$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

140 (original). A method as defined in claim 134 in which the weight vector generator step includes the step of generating an approximation for the limit point weight vector $l_{LP}$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points

$\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

141 (original). A method as defined in claim 140 in which the weight vector generator step includes the step of performing the extrapolation approximation methodology such that M=3.

142 (original). A method as defined in claim 141 in which the weight vector generator step includes the step of generating the approxiation for the limit point weight vector weight vector in accordance with

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$$l_{LP} \approx \sum_{J=0}^{3} b_J l_{LP}(J) ,$$

where "J" is a predetermined integer and where

$$\left(l_{LP}(J)\left(s_1, s_2\right)\right)_m = \left(S_{sc,Q,K.L,LP}(J)\left(s_1, s_2\right)\right)_{1,m} ,$$

where

$$S_{sc,Q,K,L,LP}(J)\left(s_1, s_2\right) := \prod_{j=J}^{0} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

with

$$S_{sc,Q,K,L,LP}(0)\left(s_1, s_2\right) := I_{2K+1} ,$$

where $I_{2K+1}$ is the "2K+1" by "2K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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143 (original). A method as defined in claim 135 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being along the smooth feature line, the feature representation generator step includes the step of determining the tangent vector $e_C(q)$ in accordance with

$$e_C(q) = \sum_{i=0}^{2K} \left(l_C(s_1, s_2)\right)_i c^j(i) ,$$

where $l_C(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_C(s_1, s_2) = d(K)^K v_c \cdot S_{sc,Q,K,L,LP}\left(s_1(j), s_2(j)\right) ,$$

where

$$S_{sc,Q,K,L,LP}(s_1, s_2) = \prod_{j=\infty}^{j_D} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

and vector $v_C$ is defined as

$$(v_c)_i = \begin{cases} 0 & if\ i = 0 \\ A_k \cos\dfrac{2\pi(i-1)}{K} & if\ i = 1,\ldots,K \\ \cos\dfrac{2\pi(i-K-1)}{K} + \cos\dfrac{2\pi(i-K)}{K} & if\ i = K+1,\ldots,2K \end{cases},$$

where

$$A_K = 1 + \cos\left(\frac{2\pi}{K}\right) + \cos\left(\frac{\pi}{K}\right)\sqrt{2\left(9 + \cos\frac{2\pi}{K}\right)},$$

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and where dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{A_K}{16} + \frac{1}{4}}.$$

144 (original). A method as defined in claim 143 in which the weight vector generator step includes the step of generating the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

145 (original). A method as defined in claim 144 in which the weight vector generator step includes the step of generating the approximation for the tangent vector weight vector $l_C$ in accordance with the polynomial

$$(l_C)_i \approx b_{i0}(s_1 - s_2) + b_{i1}(s_1^2 - s_2^2) + b_{i2}(s_1^3 - s_2^3) + b_{i3}(s_1^2 s_2 - s_1 s_2^2),$$

in the anti-symmetric case, or the polynomial

$$
\begin{aligned}
(l_C)_i \approx\ & b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + \\
& b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2s_2 + b_{i8}s_1s_2^2 + b_{i9}s_2^3
\end{aligned},
$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

146 (original). A method as defined in claim 145 in which weight vector generator step includes the step of selecting values of $s_1$ and $s_2$ in accordance with

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$$
(s_1, s_2) = \left( \cos\left( \frac{\left(i + \frac{1}{2}\right)\pi}{N} \right), \cos\left( \frac{\left(j + \frac{1}{2}\right)\pi}{N} \right) \right),
$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

147 (original). A method as defined in claim 143 in which the weight vector generator step includes the step of generating an approximation for the tangent vector weight vector $l_C$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

148 (original). A method as defined in claim 147 in which the weight vector generator step includes the step of performing the extrapolation approximation methodology such that M=3.

149 (original). A method as defined in claim 148 in which the weight vector generator step includes the step of generating the approximation for the tangent vector weight vector $l_C$ in accordance with

$$l_C \approx \sum_{J=0}^{3} b_J l_C(J) \quad ,$$

where "J" is a predetermined integer and where

$$l_C(J)(s_1, s_2) = d(K)^J v_C \cdot S_{sc,Q,K,L,LP}(J)(s_1, s_2) \quad ,$$

where vector $v_C$ is given by

$$v_C = \left(0, \cos\frac{2\pi(0)}{K}, \cos\frac{2\pi(1)}{K}, \ldots, \cos\frac{2\pi(K-1)}{K}\right) \quad ,$$

dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} \quad ,$$

and

$$S_{sc,Q,K,L,LP}(J)(s_1, s_2) = \prod_{j=J}^{j_D} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) \quad ,$$

with

$$S_{sc,Q,K,L,LP}(0)(s_1, s_2) := I_{2K+1} \quad ,$$

where $I_{K+1}$ is the "2K+1" by "2K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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150 (original). A method as defined in claim 135 in which the representation of the feature is defined by a tangent vector associated with the vertex, the tangent vector being across the smooth feature line, the feature representation generator step includes the step of determining the tangent vector $e_C(q)$ in accordance with

$$e_S(q) = \sum_{i=0}^{2K} \left(l_S(s_1, s_2)\right)_i c^j(i) ,$$

where $l_C(s_1,s_2)$ is a vector of tangent vector weight values defined by

$$l_S(s_1, s_2) = d(K)^K v_S \cdot S_{sc,Q,K,L,LP}\left(s_1(j), s_2(j)\right) ,$$

where

$$S_{sc,Q,K,L,LP}(s_1, s_2) = \prod_{j=\infty}^{j_D} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

and vector $v_C$ is defined as

$$(v_S)_i = \begin{cases} 0 & if\ i = 0 \\ A_k \sin\dfrac{2\pi(i-1)}{K} & if\ i = 1,\ldots,K \\ \sin\dfrac{2\pi(i-K-1)}{K} + \sin\dfrac{2\pi(i-K)}{K} & if\ i = K+1,\ldots,2K \end{cases},$$

where

$$A_K = 1 + \cos\left(\frac{2\pi}{K}\right) + \cos\left(\frac{\pi}{K}\right)\sqrt{2\left(9 + \cos\frac{2\pi}{K}\right)},$$

and where dilation factor d(K) is given by

$$d(K) = \frac{1}{\dfrac{A_K}{16} + \dfrac{1}{4}}.$$

151 (original). A method as defined in claim 150 in which the weight vector generator step includes the step of generating the tangent vector weight vector $l_C$ using a polynomial approximation methodology.

152 (original). A method as defined in claim 151 in which the weight vector generator step includes the step of generating the approximation for the tangent vector weight vector $l_S$ in accordance with the polynomial

$$(l_S)_i = b_{i0}(s_1 - s_2) + b_{i1}(s_1^2 - s_2^2) + b_{i2}(s_1^3 - s_2^3) + b_{i3}(s_1^2 s_2 - s_1 s_2^2),$$

in the anti-symmetric case, or the polynomial

$$\begin{aligned}(l_S)_i \quad = \quad & b_{i0} + b_{i1}s_1 + b_{i2}s_2 + b_{i3}s_1^2 + b_{i4}s_1s_2 + \\ & b_{i5}s_2^2 + b_{i6}s_1^3 + b_{i7}s_1^2s_2 + b_{i8}s_1s_2^2 + b_{i9}s_2^3\end{aligned},$$

in the non-symmetric case, in which the coefficients $b_{ij}$ are determined by a least squares methodology and the values of the parameters $s_1$ and $s_2$ are at selected values.

153 (original). A method as defined in claim 152 in which weight vector generator step includes the step of selecting values of $s_1$ and $s_2$ in accordance with

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$$(s_1, s_2) \quad = \quad \left(\cos\left(\frac{\left(i+\frac{1}{2}\right)\pi}{N}\right), \cos\left(\frac{\left(j+\frac{1}{2}\right)\pi}{N}\right)\right),$$

where "N" is a selected integer, and indices i,j=0,...,N-1.

154 (original). A method as defined in claim 150 in which the weight vector generator step includes the step of generating an approximation for the tangent vector weight vector $l_S$ using an extrapolation approximation methodology in relation to an M-degree polynomial that interpolates the points $\left\{x = 2^{-2^J}, y = l_{LP}(J)\right\}$, J=0,...,M and then evaluating this polynomial by extrapolation at the point x=0.

155 (original). A method as defined in claim 154 in which the weight vector generator step includes the step of performing the extrapolation approximation methodology such that M=3.

156 (original). A method as defined in claim 155 in which the weight vector generator step includes the step of generating the approximation for the limit point weight vector weight vector in accordance with

$$l_S \approx \sum_{J=0}^{3} b_J l_S(J) ,$$

where "J" is a predetermined integer and where

$$l_S(J)(s_1, s_2) = d(K)^J v_S \cdot S_{sc,Q,K,L,LP}(J)(s_1, s_2) ,$$

where vector $v_S$ is given by

$$v_S = \left(0, \sin\frac{2\pi(0)}{K}, \sin\frac{2\pi(1)}{K}, \ldots, \sin\frac{2\pi(K-1)}{K}\right) ,$$

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dilation factor d(K) is given by

$$d(K) = \frac{1}{\frac{3}{8} + \frac{1}{4}\cos\frac{2\pi}{K}} ,$$

and

$$S_{sc,Q,K,L,LP}(J)(s_1, s_2) := \prod_{j=J}^{0} S_{sc,Q,K,L}\left(s_1(j), s_2(j)\right) ,$$

with

$$S_{sc,Q,K,L,LP}(0)(s_1, s_2) := I_{2K+1} ,$$

where $I_{2K+1}$ is the "2K+1" by "2K+1" identity matrix, and where

$$b_0 = \frac{-135}{120015}$$

$$b_1 = \frac{1270}{120015}$$

$$b_2 = \frac{-12192}{120015}$$

$$b_3 = \frac{131072}{120015}$$

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